

**DOCTORAL (PHD) STUDIES
COURSE DESCRIPTION**

Course title	Field of science	Faculty	Institute
Stochastic Analysis	Mathematics (N 001)	Faculty of Mathematics and Informatics	Institute of Mathematics
Study method	Number of credits	Study method	Number of credits
Lectures	0	Consultations	1
Individual work	4	Seminars	0

Course summary

1. The main notions of probability theory.
2. Brownian motion.
3. Stochastic models with Brownian motion and white noise.
4. Itô's formula.
5. Stochastic differential equations (SDEs).
6. Itô processes.
7. Stratonovich integral and equations.
8. Linear stochastic differential equations.
9. Solutions of SDEs as Markov diffusion processes.
10. Applications to physical sciences and finance.
11. Numerical solution of SDEs.
12. Elements of multidimensional stochastic analysis.

Main literature

1. Mackevičius V. *Introduction to Stochastic Analysis: Integrals and Differential Equations*, ISTE/Wiley & Sons, London, 2011.
2. Oksendal B., *Stochastic Differential Equations*, 5th ed., Springer, 2000.

Consulting teacher	Scientific degree	Pedagogical name	Main publications in the field of science of the last 5 year period
Vigirdas Mackevičius	Habil. dr.	Prof.	<ol style="list-style-type: none"> 1. G. Lileika and V. Mackevičius, Second-order weak approximations of CKLS and CEV processes by discrete random variables, <i>Mathematics</i>, 2021, 9, 1337. 2. G. Lileika and V. Mackevičius, Weak approximation of CKLS and CEV processes by discrete random variables, <i>Lithuanian Mathematical Journal</i>, 2020, 60(2), 208-224. 3. V. Mackevičius and G. Mongirdaitė, On backward Kolmogorov equation related to CIR process, <i>Modern Stochastics: Theory and Applications</i>, 2018, 5(1), 113-127. 4. V. Mackevičius, <i>Stochastic Models of Financial Mathematics</i>, ISTE Press–Elsevier, 2016.

Approved by the Board of Faculty of Mathematics and Informatics 10/12/2021. Resolution No. (1.5 E) 110000-TPN-42

Board Chairman – assoc. prof. dr. Kristina Lapin